

# Light Engineer Lessons Learned in the Contemporary Operational Environment

*By Captain Philip J. Dacunto and Captain (Bo) Arnold*

**W**hile executing combat operations after a sudden deployment to Southwest Asia, light sappers of the 41st Engineer Battalion, 10th Mountain Division, Fort Drum, New York, gave new meaning to the motto *Essayons*. Operating first in Uzbekistan and then in Afghanistan, the light engineers performed numerous construction and area clearance missions for which they had never trained. Their combat successes can only be attributed to their versatility and ingenuity, especially when tools and training for certain uncommon tasks were lacking.

## Deployment

**T**ask Force 1-87 Infantry assumed the division ready force mission on the day before the 11 September 2001 terrorist attacks on New York City and Washington, D.C. Alpha Company, 41st Engineer Battalion, provided habitual support to the task force with a light engineer platoon. Consisting of three 8-man sapper squads and a 3-man platoon headquarters, the engineer platoon was trained in customary mobility, countermobility, and survivability support to a light infantry battalion task force.

On 20 September, the task force was assigned an emergency readiness deployment exercise (EDRE), designed presumably to further prepare it for responsibilities as the division ready force. The entire task force underwent routine checks to ensure that each soldier was ready for deployment with regard to medical, legal, and financial requirements. The sappers then requalified on individual weapons and loaded their prepacked personal, squad, and platoon equipment. This included palletization of equipment and bags and U.S. Air Force joint inspection of equipment and vehicles. The EDRE followed standard routines until the task force members received new chemical overgarments, body armor, and desert camouflage uniforms. It was now clear that this was more than just another training exercise.

Learning that their squad vehicles were an extremely low priority for air movement, the sappers refined packing lists and palletized almost all of their equipment, along with Class IV supplies for constructing protective wire and fighting positions at the destination, wherever that might be.

On 2 October, the first elements of Task Force 1-87 Infantry repositioned to Fort Drum's rapid-deployment facility to load



**Engineer soldiers construct a roadblock.**

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aircraft for their final, classified destination. In the next few days, remaining elements of the task force continued this flow through the rapid-deployment facility until all had deployed.

## Uzbekistan

**O**n 5 October, the sapper platoon leader awoke on a dusty air base in Uzbekistan, with only 50 other Americans within thousands of miles. During the days that followed, his squads arrived with their supported infantry companies.

As anticipated, initial sapper missions included counter-mobility (wire and obstacles) on the perimeter and survivability within the base camp. However, the requested dig asset package of two small emplacement excavators (SEEs) and one D7 bulldozer had not been high enough on the airflow priority to make it into country. Relying exclusively on hand tools, sapper productivity was severely limited. After two weeks, a loader and a SEE arrived with a logistics task force, but the light engineers could only borrow the equipment for limited periods of time. Nonetheless, within 30 days, the small platoon emplaced more than 8,500 meters of defensive wire around the air base and eventually built more than 40 fighting positions and bunkers.

Task Force 1-87 Infantry relied on the sappers for construction as well. Although they were neither formally trained nor equipped for vertical construction missions, the sappers were initially the only engineers in the area and were assigned all types of engineer missions. While at the air base, the platoon built a tactical operations center inside a hardened aircraft shelter, numerous tent platforms, four guard shelters, and a detainee facility. In addition to carpentry skills, the platoon often used the welding skills of some of its soldiers.

## Afghanistan

**A**s the Afghanistan Northern Alliance's operational successes changed the strategic situation, the task force prepared for another deployment and new missions. Moving forward with their habitually associated infantry companies, sappers cleared land and developed bases at several bare-bones airfields in Afghanistan. With an estimate of more than eight million mines emplaced within Afghanistan's borders and minimal marking or recording of their locations, the risk to forces operating there was extreme. In addition, there was a significant risk of unexploded ordnance (UXO) left over from more than a decade of war.

Clearing areas for force bed down soon became a concern at the operating bases, as the new units that were arriving needed lodgment areas faster than engineers could clear them. Around Baghrām Air Base, which became a major U.S. and coalition force forward operating base, all areas had a high risk of mines and UXO and had to be thoroughly cleared before use. Through coordination with local Northern Alliance commanders, sappers began by mapping out the locations of the minefield using laser range finders and Global Positioning



**Engineers construct a guard checkpoint.**

System (GPS) coordinates. Then they prioritized clearance requirements and began clearing with their limited assets.

The sappers soon found that their organic AN/PSS-12 mine detectors were of minimal value because of the large amounts of metal scraps and other detritus left in the ground from earlier fighting. Fortunately, a coalition Army unit at Baghrām was equipped with a medium-sized Aardvark flail, which could be used to clear and proof selected areas. While progress was slow and communications with the foreign soldiers sometimes difficult, the platoon was able to clear several areas for base camp construction and airfield improvements.

After the Aardvark departed, the sappers relied exclusively on miniflails, but this equipment cleared at a very slow rate. Also available for area clearance—from B Company, 92d Engineer Battalion—was one D7 dozer fitted with a mine-clearing armor-protection (MCAP) kit that provided protection for the operator. This MCAP dozer allowed safe clearance of larger areas.

Concurrently with land clearing, the light sappers performed construction missions as well. Initially, the only other engineer unit at Baghrām was a platoon from the 92d Engineer Battalion,



**The MCAP dozer with operators from B Company, 92d Engineer Battalion**



**Engineer soldiers weld a gate at Baghram.**

but this superb vertical construction unit was a limited asset with a long list of tasks. Thus, the smaller jobs—especially those related to survivability and countermobility—fell to light sappers. In addition to emplacing thousands of meters of wire during a two-month period at Baghram, the sappers built or assisted with two detainee facilities and several guard checkpoints, installed doors and windows in a guard building, constructed improvised Hesco bastions for use at entry control points, welded gates and drop arms, and completed a wide variety of other tasks. They borrowed tools and employed more and more carpentry and welding skills.

In a couple of months, other engineer units arrived at Baghram to augment the base's construction and mine-clearing capabilities. Included were a U.S. Air Force Rapid Engineer-Deployable, Heavy-Operations Repair Squadron—Engineer (RED HORSE) team and coalition assets such as a general-purpose engineer platoon, runway repair experts, and a mine-clearing detachment.

### **Operation Anaconda**

**I**n late February 2002, light sappers again showed their mettle in direct combat operations. Headquarters, 10th Mountain Division, initially designated as Coalition Forces Land Component Command-Forward (CFLCC-FWD), had moved into Baghram, redesignated as Coalition Joint Task Force-Mountain (CJTF-MTN), and assumed control of all conventional and special operations forces in Afghanistan. Additionally, CJTF-MTN began planning for what would eventually become Operation Anaconda, to eliminate a pocket of Al-Qaeda and Taliban forces in an area of the Paktia Province.

Task Force 1-87 Infantry's mission was to establish positions to block Al-Qaeda and Taliban troops fleeing the area after a concurrent attack by Afghan military forces. On 2 March—and under 3d Brigade, 101st Airborne Division command—the task force conducted an air assault into several landing

zones. Although initially rebuffed by intense enemy activity at one landing zone, the task force successfully inserted and conducted continuous operations over the next nine days along a ridgeline at elevations between 8,000 and 10,000 feet—possibly the highest elevations at which the U.S. Army has ever conducted combat operations. The task force routed out enemy forces that had not yet withdrawn and destroyed caches and caves.

The task force commander attached a squad of light sappers to each infantry company with the platoon leader and platoon sergeant integrated into the battalion command posts, thus providing maximum flexibility and capabilities for the maneuver commanders. This close attachment proved essential because the rugged, high terrain made it impossible for sappers to move quickly between separated maneuver units. During planning, sappers focused on mobility and countermobility tasks, preparing to breach lanes through minefields and create obstacles at the blocking positions. During Operation Anaconda, however, sappers focused mainly on cache destruction. They made maximum use of their demolition skills, destroying caches of rocket-propelled grenades, recoilless rifles, small arms, mines, and even several howitzers, with only the demolitions that they carried on their backs. This often called for innovation, as they used limited demolitions to destroy the maximum amount of enemy equipment. For example, the sappers disabled the captured howitzers using claymore mines to augment the remaining two blocks of C4 demolition at that location.

Some of the limitations during Operation Anaconda were the weight of the soldiers' loads and the limited availability of resupply. Although leaders revised packing lists carefully to minimize excess after the initial insertion, soldiers learned that they had to pare down even more. They could not move and fight at the extreme altitudes while carrying even a modest rucksack load. Officers and NCOs ensured that their soldiers used a minimum of the most effective clothing to combat the



freezing temperatures. They left behind all cotton items—even their desert camouflage uniforms—for a uniform of polypropylene and Goretex. To help lighten the load, some units deployed without sleeping bags, which were delivered a day or two later. Load limitations were particularly challenging for sappers, who brought only the most essential tools for their mobility and countermobility tasks. Planned obstacles relied on the innovative use of limited demolitions, and some materials—such as those for lane marking—had to be kept to an absolute minimum. Sappers relied almost exclusively on C4, leaving heavy bangalore torpedoes, cratering charges, and shaped charges back at Baghram, ready to be pushed forward should they be needed.

## Lessons Learned

**T**he light engineer platoon learned several important lessons from its deployment to Southwest Asia, which fall into three categories: deployment readiness, sapper tools, and sapper training.

### Deployment Readiness

*Don't reinforce one platoon too heavily at the expense of others for any operation.* This is important whether the deployment is to the Joint Readiness Training Center or if it is an operational deployment. In our case, the priority of company personnel and equipment supported another platoon's impending rotation to Kosovo. As a result, our platoon deployed with only 21 of the 27 soldiers it was

authorized, and it had more pronounced supply shortages than it might otherwise have had. This made the short period following the EDRE that much more difficult as leaders throughout the company sought to cross-level yet again.

*Light engineer squads should not become too reliant on their vehicles.* Modern deployments are usually made by air, and there is seldom enough space for all the authorized equipment. In our case, space was allocated for only one high-mobility, multipurpose, wheeled vehicle (HMMWV), so load plans designed for squad vehicles were not useful, and most squad equipment was palletized. In addition, sappers had to use their rucksacks to carry demolitions, breach kits, and other critical tools. Thus, it is important to have load plans with and without squad vehicles.

*A survivability package of two SEEs and a D7 dozer should be on call for the division ready force engineer platoon.* This package, assembled after our alert, was not assigned a high enough priority to make it into the airflow. The equipment would have dramatically increased countermobility and survivability capabilities, especially with the wide variety of pneumatic tools on the SEE. The light sappers used mostly hand tools to dig survivability positions and emplace wire to protect the airhead.

### Sapper Tools

*A pneumatic picket pounder attachment should be included with the SEE for deployments.* The platoon emplaced more than 8,500 meters of wire for survivability positions and



**An engineer clears an area with a miniflail.**

obstacles in Uzbekistan. The attachment could have been palletized with minimal impact to aircraft space and would have greatly improved productivity.

*Light sappers need to deploy with organic carpentry tools.* Since light sappers were the first engineers on the ground in Uzbekistan, and construction engineers did not arrive for another month, many tasks normally assigned to vertical construction engineers fell to the light sappers. While their skills were adequate for the rudimentary construction jobs assigned, they had no carpentry tools. At a minimum, a power saw, power drill, hand saw, hand drill, and hammers should be procured locally, if necessary, and deployed whenever base development tasks may be assigned. Perhaps these common carpentry tools should be added to the light engineer squad tool sets. Larger equipment that would be very useful includes a reciprocating saw, hammer drill, small arc welder, and gas-powered cutter with a carbide blade. In addition, a small generator for the power tools would prevent the sappers from having to borrow power from other sources. These should either be deployed with the leading sapper unit or palletized for call forward. Again, perhaps these should be added to the platoon or company headquarters modified table of organization and equipment.

*Detection tools incorporating ground-penetrating radar, such as the Handheld Standoff Mine-Detection System (HSTAMIDS), would be extremely helpful in augmenting existing or improved metal detectors (for example, the AN/PSS-12 and FIA4 Minelab).*

*A team of mine-detection dogs with handlers should be available to any deployed light sapper battalion facing significant mine-clearing missions.* Mine-detection dogs were invaluable at Baghrām, especially for proofing areas for mines and UXO. Dogs frequently found UXO in areas that were surface-swept, flailed, and scraped by both an MCAP dozer and a grader!

*The sapper platoon needs a medium-sized flail, about the size of a HMMWV, that is deployable by C-130.* The miniflail was helpful in proofing small areas, but it had serious maintenance problems and lacked the necessary power. Scraps of metal and uneven terrain defeated it, and because of its small width, it was unsuited for clearing large areas. A mid-sized foreign flail, the Hydrema, was extremely effective and cleared large areas at Baghrām, but its size and weight would be a limitation for strategic deployment. Clearly, these additional mine-clearing assets need not be organic to every light engineer company. However, they should exist somewhere in the force structure and be attached to deploying units whenever minefield/UXO clearance is likely to be a significant task.

### **Sapper Training**

*Sappers must be able to clear large areas for base camps and assembly areas.* The light sappers' capabilities in this area are weak, primarily because platoon tasks and company mission-essential task lists usually do not address area

clearance for operational purposes. Instead, training most often focuses on breaching and bypassing. In reality, today's operational environment includes not just carefully laid obstacles in specific locations but often huge areas littered with mines and UXO.

*Sappers need to be trained to defeat or reduce mines in a variety of ways.* When confronted with mines, sappers are well-trained to either destroy them in place or bypass them. However, traditional destruction of mines with demolitions endangers nearby personnel and equipment and spreads explosive residue around, reducing the subsequent effectiveness of mine-detection dogs in that area. Sappers must be well-versed in the use of available flails, but we believe that more importantly, they must be experts in identifying and defusing most types of foreign mines. At a minimum, they should understand the design and attributes common to sets of mines that can contribute to inferences about other types of mines not previously studied. Mine instruction should also include disarming and defusing them so they can be removed safely and negate the requirement for explosive disposal. A rudimentary knowledge in identification of UXO is essential as well. Explosive ordnance disposal (EOD) assets are extremely limited, and when sappers are clearing areas, they are just as likely to find UXO as mines. Once UXO is found, engineers should still rely on EOD personnel to clear it.

Since it would be an impossible training challenge to bring all sappers up to these standards, one way to achieve a limited capability would be to train some trainers—perhaps one NCO per sapper squad—in a “master countermine course.” Once trained, these sergeants would be certified as master countermine trainers. They would return to their home station and teach other members of their squads to clear areas for operational use, in addition to breaching and marking bypasses.

### **Conclusion**

**W**hile the brown hills and dust of Uzbekistan and Afghanistan are now a fading memory for our company, other light sappers may deploy to another bare operational base in a mine- and UXO-littered area in the future. Therefore, all light engineers should benefit from these lessons learned and try to improve engineer tools and training. Such improvements, coupled with the *Essayons* spirit, will ensure accomplishment of the challenging light sapper missions ahead.



*Captain Dacunto was the company commander who trained, deployed, and supported the sapper platoon. He concurrently served for three months in Afghanistan as the assistant division engineer in Headquarters, 10th Mountain Division.*

*Captain Arnold served as platoon leader through-out the six-month deployment. He was awarded a Bronze Star for meritorious achievement for his actions during the deployment and during Operation Anaconda.*